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The American Biology Teacher

Vol. 8 JANUARY, 1946 No. 4

A Technique for Chick Fetal
Skeleton Staining
- - - - - A. C. Warrington 75

We Need a New Type of
Conservation Education
- - - - - Sylvia M. Moyano 78

A Bird Feeding Station
- - - - - Edwin F. Sanders 80

Biology in Nebraska High Schools
- - - - - Harry E. Peterka 81

American Biology Teacher
Calendar - - - - - 83

Editorial Comment - - - - - 84

Notes and News - - - - - 86

Use the Home Pressure-Cooker
to Sterilize Culture Media
- - - - - Donald S. Lacroix 88

An Analysis of Articles in The
American Biology Teacher
- - - Dorothy Lunsford and
Lee R. Yothers 89

Education Fights Poliomyelitis - 91

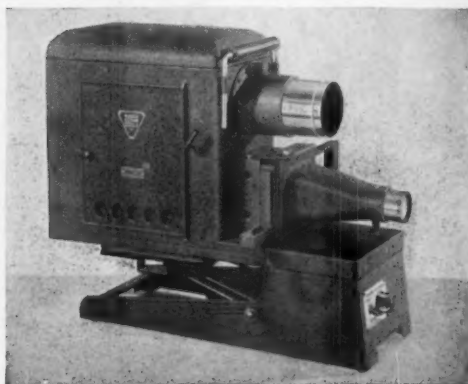
Recent Publications - - - - - 92

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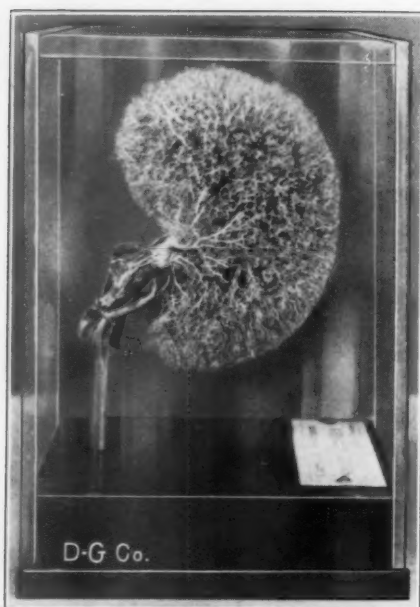
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The American Biology Teacher

Vol. 8

JANUARY, 1946

No. 4

A Technique for Chick Fetal Skeleton Staining Using Alizarine Red S

A. C. WARRINGTON

West Virginia State College, Institute, West Virginia

Several biologists have used some form of modification of the KOH method in staining osseous tissues. This method of staining the fetal skeleton of chick embryos up to 19 days of age has been carried out very effectively in the routine work of our laboratory. It may be applied with equal success in embryos of the mouse. Moreover, it is a simple and efficient method for illustrating the gross skeletal structures, especially the appendages, the thoracic cavity, the vertebral column, and the fontanelles in skull formation. I have found it advantageous to use an aqueous solution of *Alizarine Red S* instead of an alcoholic solution because here destaining is rarely necessary. In other words, there should be little or no need for acid alcohol as a decolorizing agent in this technique, because acids have a bad effect on bone structure. Biologists interested in developmental and gross anatomy will find many uses for a series of these specimens of varied ages. The specimens also make beautiful museum mounts, especially

when arranged in a glass case with indirect lights. In this case it is not necessary to eviscerate.

Reagents Used

A. *KOH Solutions*—Prepare a stock solution of 1000 cc. of a 3% solution of KOH; from this solution one should prepare 400 cc. each of a 1½% solution and a 1% solution.

B. *Alizarine Red S Solutions*—Prepare a saturated aqueous solution of *Alizarine Red S*. The saturated solution is brown and turns red upon dilution. In staining add two drops of this stock solution to 100 cc. of 1% KOH. This amount will adequately cover the embryo.

C. *Percentages of Alcohol Solutions*—Prepare 100 cc. of 75% alcohol and 300 cc. of 95% alcohol. The 75% alcohol is made from 95% grain alcohol and distilled water. Methyl alcohol is fairly satisfactory and is figured on a basis of 90% strength.

D. *Glycerine Solutions*—

(a) Twenty-five parts glycerine, one part KOH, 1% solution, and seventy-four parts distilled H₂O;

(b) Fifty per cent, 75%, and 85% glycer-

ine solutions are made up with distilled H_2O only. Add a few small crystals of thymol to each of the above solutions to prevent decomposition.

Technique

1. The embryo is carefully denuded, thoroughly eviscerated and then placed in 75% grain alcohol for 12 hours. The specimen is again placed in two changes of 95% alcohol for a period of four days. Fixation is very important and one must also watch for shrinkage. It is well to note, however, that undue shrinkage is counteracted by the KOH treatment.

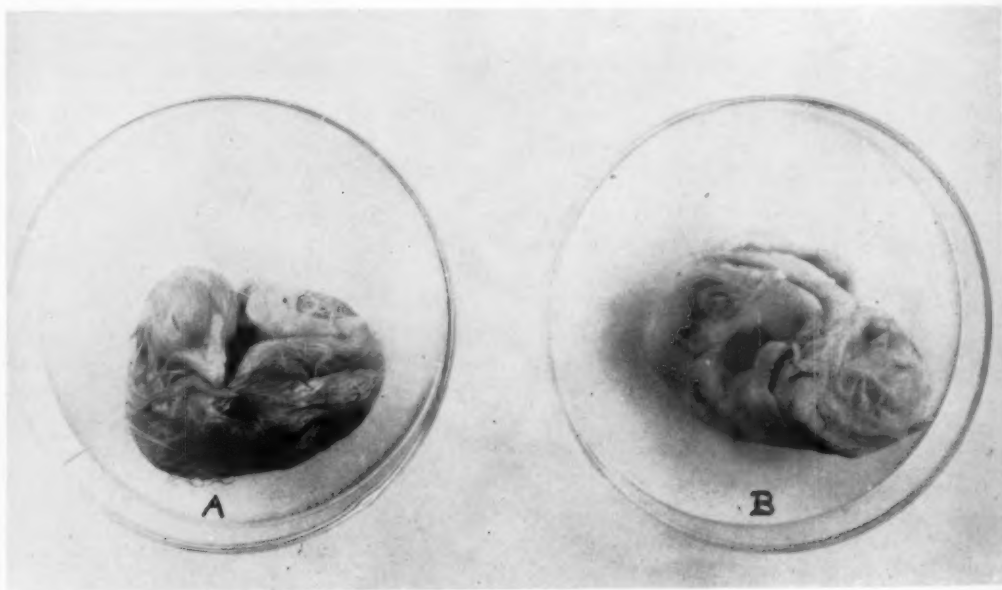
2. The embryo is placed in at least four changes of a 1½% solution of KOH for seven days. This technique is used for chick fetuses of 17–19 days of age. Younger fetuses do not require this much time for macerating the flesh. The first bath should be changed after 24 hours. In each of the succeeding baths, add eight drops of glycerine to the 100 cc. of hydroxide solution. Do not move specimens around in the container; siphon off all of the solutions. The

specimen should be left in the last solution until the bones show clearly through the flesh. This step is doubly important because transparency of the flesh obviates the need for acid alcohol or any other decolorizer. The last two solutions may be saved for future use.

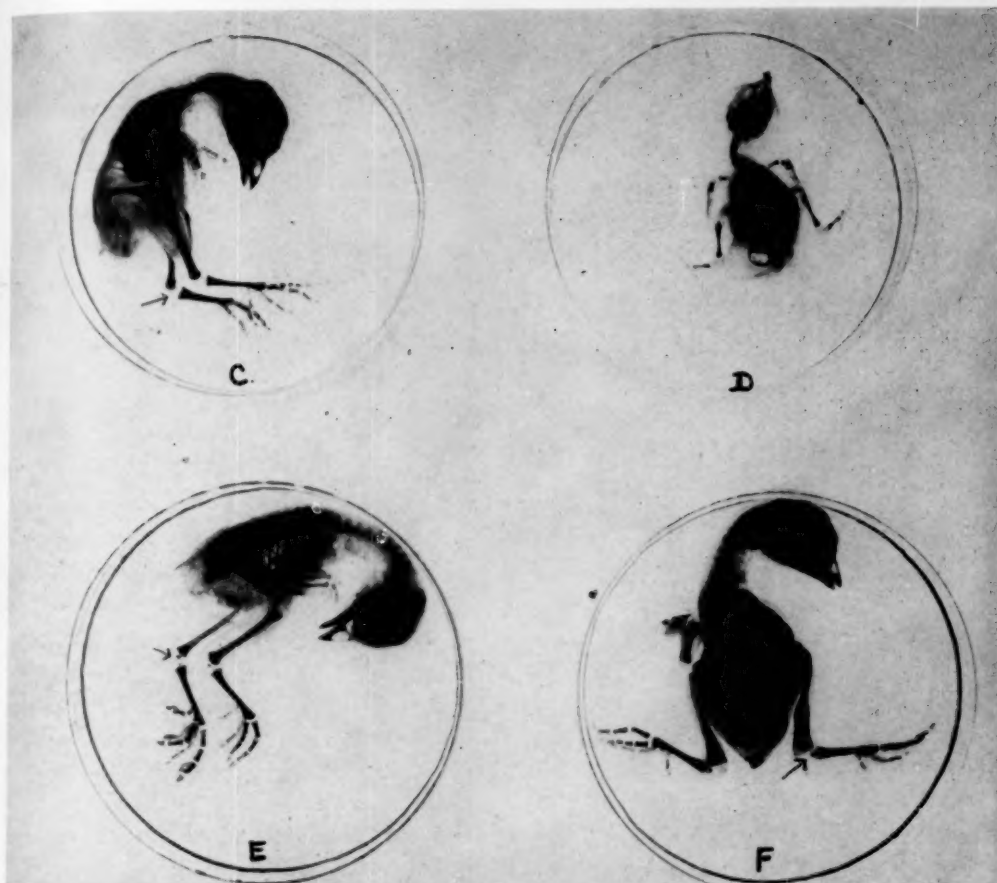
3. Add to the fetus 100 cc. of fresh 1% KOH solution to which have been added two drops of *Alizarine Red S* stock solution and eight drops of glycerine. The selective staining power of the diluted solution is discernible after a few hours. The osseous tissues should be deeply stained in 18–20 hours.

4. After the desired degree of bone staining is attained, siphon off the Alizarine staining solution and clear in *Glycerine Solution* (see 'a' under *D of Reagents Used* for a period of 72 hours. The specimen is then placed in 50%, 75% and 85% glycerine solutions for two days each.

5. The specimen may now be preserved indefinitely in pure glycerine to which two or three small crystals of



A. A 19-day-old chick, removed from the shell, showing general features; the head is moved out of its position for photographic purposes.
B. This specimen has been denuded, eviscerated, and fixed in 95% alcohol.



Specimens *C*, *E*, and *F* are chick fetuses and specimen *D* is a sparrow in the feather tract stage. These specimens have been macerated in KOH and cleared in glycerine. The clear spaces between the joints are cartilages which are not affected by the stain. Note absence of ossification indicated by arrows in figures *C*, *E*, and *F*. The specimens have been arranged in varied positions to present as many anatomical features as possible. A close examination of photograph *D* will reveal the incomplete ossification of the skull bones.

thymol have been added. With care the fetus may be arranged in any desired position for display.

If one follows this technique closely, fetal skeleton staining may be accomplished without great difficulty. In older embryos adipose tissue is quite prevalent; the fat may be partially removed by immersing the specimen in 100 cc. of pure acetone for a period of five days. The acetone treatment should follow step 1. The writer has supplemented the above process by hypoder-

mically injecting acetone in the heavily laden areas. After the acetone treatment the embryo is again immersed in 95% alcohol. The specimen should remain in the alcohol for two days for the best results. The scheme is then followed in sequence.

The small quantities of glycerine used throughout this technique prior to preservation proves to be a very effective measure in preventing too rapid maceration of the flesh. Since the cartilage does not stain in this process, a series

of these specimens show progressive bone development and make beautiful demonstrations for classes in embryology and comparative anatomy. This study is now being carried on in our laboratory with encouraging results.

REFERENCES

- DAWSON, A. B.—*Stain Technology*, I, 4.
MCCLUNG—*Microscopical Technique*
KRAJIAN—*Histological Technique*
LIPMAN—*Stain Technology*, X, 61, 1935.
WARRINGTON—*Turtlox News*, Vol. 23, 10.

We Need a New Type of Conservation Education

SYLVIA M. MOYANO

Flower Technical High School, Chicago, Illinois

Conservation cannot just be taught! It must also be evangelized! It cannot be accomplished only by workbooks, notebooks, textbooks, or maps. We must also use story, song, picture, hike, poem, anything that will appeal to the spirit. It is the spirit, soul, or heart which we wish to reach as well as the mind. Let us not have so many lessons beginning with, "How much forest area was there in the United States in 1620? How much of it remains today?" Rather read or sing Joyce Kilmer's "Trees" with real sympathy and feeling. It will, in the writer's opinion, do ten times as much in stimulating a lasting, carry-over reaction in the listeners.

We are all agreed that conservation education is one of our crying needs. Lack of respect for public parks and forest preserve areas, even to the point of open vandalism, seems to be one of the weaknesses in the character of our young people. Unlawfully placed fires, broken branches or whole trees, bark cut into, wild flowers picked and trampled, abandoned refuse piles, all show that much of our holiday spirited public is utterly devoid of any real sentiment for natural beauty. If we make a concentrated effort to instill a true love of the out of doors as Nature made it, we can do so in the schools. It will be slow

work. It cannot be done in a day. But perseverance in a well-planned program can do wonders in a few years. Young evangelists, inspired now, can help greatly to carry this work into the future.

A step in this direction has been taken by Roberts Mann, Head of the Department of Conservation of the Cook County, Illinois, Forest Preserve. In collaboration with David H. Thompson, Director of Conservation Education for the Cook County Forest Preserve, Mr. Mann has conducted a series of field trips and hikes for elementary and high school students and biology teachers. A corps of volunteer teachers, recruited from members of the Chicago Biology Round Table, took these trips with the purpose of observing methods and noting reactions on the part of the young people. The excursions were taken on Saturdays, throughout the spring of 1945. The leaders of these tours are experts and enthusiasts with a lifetime of training and experience. Large groups of boys and girls, under their inspiring guidance learned to know and appreciate the birds, trees, flowers, insects, and fish. This is the type of procedure we much use to arouse the real understanding of forest life and beauty in the hearts of the youngsters.

Some years ago the writer organized, at Flower High School, in Chicago, a club with conservation education as its aim. The members called themselves "The Wanderers" and they did just that. They hiked and sang through the parks and forest preserves, building up a love for growing and living things which would make impossible the thought of ever harming them. We had as our pledge and our motto: "I pledge myself to be a citizen of Nature. I promise to protect the birds, respect the trees and refrain from picking the wild flowers; I will always leave the parks and forest preserves better than I found them; I will never voluntarily destroy any natural beauty."

This informal club approach is the best way to accomplish the very necessary objective of creating a conservation consciousness in the minds of our boys and girls. We must, even at some sacrifice to ourselves, get them out into these natural beauty spots under the leadership of an evangelist, one who is on fire himself with a love and a respect for God's natural gardens, and who has the power of kindling the spark in the hearts of others. Let us organize clubs, or promote Scout memberships, and wherever possible, take whole classes out. The object of these trips, however, must be not simply to learn scientific names and ecological facts, but also to observe and to get the children to see how each creature, plant or animal, has its own needs and is entitled to life, liberty, and the pursuit of happiness in fulfilling them.

Talks and movies by men like the famous naturalist, Sam Campbell, may help also and would be a very good substitute in districts where conditions make actual trips impossible. Motion pictures and slides, both before the excursions and afterwards, will prepare the ground and keep interest alive once it has been

awakened. There is great need for more and a better type of motion picture material in the field of conservation of natural life.

If we would have our young citizens respect natural beauty let us take them out to view it through a nature lover's eyes.

LETTERS TO THE EDITOR

... Every year at the last of school, our school has honor day. On this day, honors are given in the various departments.

I should like to give one in Biology. Could you tell me how to go about this?

I should like for The National Association of Biology Teachers to make it possible to give awards so that they will stand for something.

Very truly yours,

THELMA V. FEELER,
Shield High School,
Seymour, Indiana

... We are desirous of securing up to date material on plans for a laboratory-classroom and I am inquiring as to the possibility of getting such information through *The American Biology Teacher*. ... Is such material available, or can you suggest places or persons I might contact? ...

Very truly yours,

MARGARET JORGENSEN,
Libertyville Township High School,
Libertyville, Illinois

ALL READERS who have suggestions to offer in regard to either of the above problems are invited to send them to the writers of the letters, and also to submit them to the editor for consideration for publication. Incidentally, see *A Living Biology Laboratory*, by IRVING C. KEENE, in the May, 1945, issue of *The American Biology Teacher*, page 173.

BY THE WAY

PROTOZOAN INFUSIONS are much more productive if pond vegetation and pond water are used instead of hay or leaves and tap water. Stuff a handful of lily pads, etc., into a one- or two-quart jar and cover with water. Place in a well-lighted window where direct sunlight is limited.

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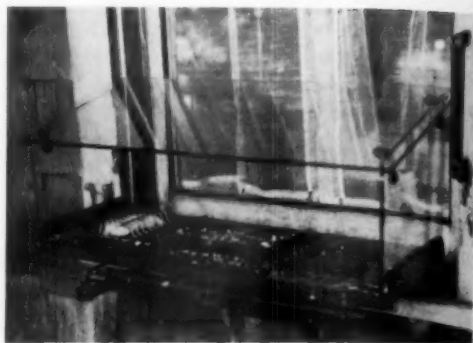
A Bird Feeding Station

EDITOR, *American Biology Teacher*

Dear Sir:

At the Chicago Meeting the other day, I mentioned to you a plate glass feeding station that might interest biology teachers and bird enthusiasts. I am enclosing a brief description of the station, also drawings in India ink, together with a photograph (taken before the installation of the anti-squirrel apron).

The station is placed outside a south window, as a means of attracting birds for close observation. The one shown in the illustrations was designed and built by Mr. Walter A. Peirce, a nature enthusiast who lives in Racine, Wisconsin. During the several years of its operation, he has been able to see many species of birds close up and to photograph them.



The plans and photographs are presented with his permission.

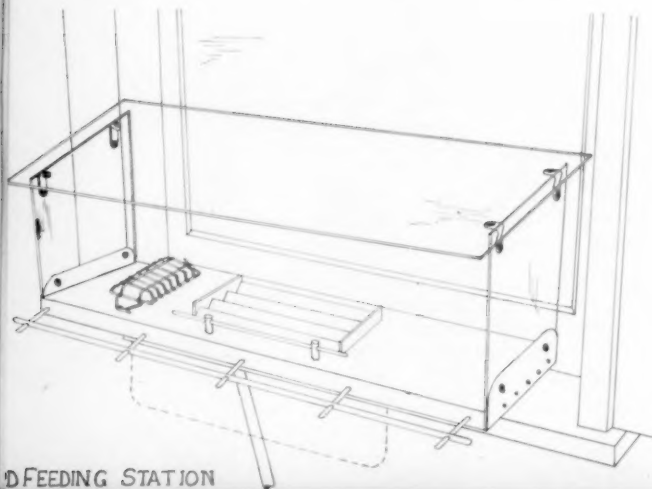
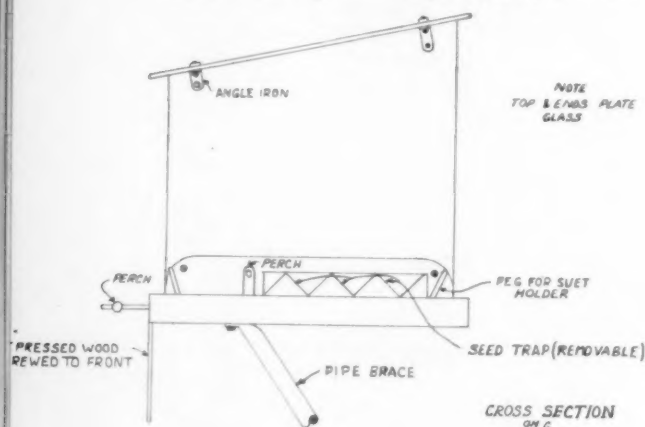
SPECIFICATIONS

The top glass is 27×12 inches, the sides $7\frac{1}{4} \times 9\frac{1}{4}$ inches. The tray grating for seeds or other loose food placement measures $5\frac{1}{2} \times 8\frac{1}{2}$ inches. Its bars are triangular in cross section, with a base of $1\frac{1}{2}$ and sides $\frac{3}{4}$ inches, loosely anchored to the base by two short dowels, so it may easily be removed and the base board swept clean at intervals. The base board is made of cypress $\frac{3}{4}$ inch thick and measures 12×25 inches. The angles are of brass and are fastened with brass bolts and nuts. The side irons to which the base and sides are attached are $\frac{1}{8} \times 2 \times 12$ inches. The pressed wood apron shown by the dotted lines is $\frac{1}{4}$ inch thick and measures 6×18 inches. It is screwed to the front edge of the base board to prevent squirrels from taking the food intended for the birds. The inverted soap tray guards the suet supply against bulk removal. One caution is suggested to builders of such a glass food counter: be sure to grind the edges and corners of the glass so there will be no sharp edges and so that the edges may be visible without glare.

Both Mr. Peirce and I hope that this suggestion may prove practical to many of your readers.

Sincerely yours,

EDWIN F. SANDERS,
Washington Park High School,
Racine, Wisconsin



FEEDING STATION

Biology in Nebraska High Schools

HARRY E. PETERKA

Nebraska State Teachers College, Wayne Nebraska

This survey was conducted for the purpose of determining the status of biology in the various curricula of the high schools of Nebraska with a view toward coordination of college and high school teaching. The final basis for judgment as to the value of such a study will be in its effect upon future high school teachers as pertains to their selection of courses and upon the college teachers whose duty it is to train these potential teachers. It is my belief that any student who has inclinations toward becoming a teacher should have available to him all the current facts concerning the opportunities in different fields and the requirements which will be made of him in any chosen field. The findings of this survey will acquaint the prospective teacher of biology with the facts as they were in the high schools of Nebraska during the year of 1944-1945.

In making the study, questionnaires were sent to 153 schools all of which were included on the list of those in the state accredited either by the University committee on Accredited Schools or by the North Central Association of Colleges and Secondary Schools or by both. Of these schools 95, or slightly over 62%, filled in the questionnaire in full. This percentage seemed high enough to conclude that the trends and conditions thus indicated were representative of Nebraska high schools in entirety. The total enrollment of the 95 schools was 35,689. Of these students, 4,777, or something over 13% were studying biology. Only 1,676, or 4+%, were studying chemistry, and 1,679, or 4+%, were studying physics. Only five of the

schools offered no biology, and in some of these five, biology was offered in alternate years with chemistry or physics.

Of the teachers teaching biology in these 95 schools, 11 were found to have no college hours in either zoology or botany. Of these eleven, seven indicated that they had college hours in chemistry and physics ranging from a total of 8 to 32. The other four indicated no college hours in any science. In addition to items asked for in hours of college work related to biological training, others were indicated but were not in sufficient quantity to alter the results of the survey, and thus being negligible were omitted. The average number of hours of zoology and botany per teacher was 17 for the whole group, while the average number of hours of chemistry and physics was 23. These averages would be indicative of sufficient training if every teacher had the minimum number, but of course that was not the case.

In order to determine whether teachers in the larger schools were better prepared than those in the smaller schools, I divided the schools into three groups labeled A, B, and C. The basis for division was the number of students enrolled. Of the 95 schools, 13 fell into the A group and were schools having enrollments of over 400. In the B group there were 39 with enrollments ranging from 151 to 400, and the remaining 43 schools were in the C group with enrollments of less than 151.

My basis for adequate preparation was considered as 15 hours in biology. The University Accreditation Board and

the North Central Association recognize as adequate preparation *fifteen* hours in the field of science with *five* hours in the specific subject taught. Of the 95 teachers who answered the questionnaire, 13, or 13+%, did not have the latter requirement, 11 having no college hours in any science, and the other two listing only 3 and 4 college hours in zoology or botany.

In Class A schools only two teachers teaching biology did not have the fifteen-hour requirement. One of these teachers had other hours in chemistry and physics. So the percentage of unprepared teachers in Class A was slightly over 15%. Only one teacher was better prepared to teach another science and that by only a few hours. In Class B schools 19, or 48%, were unprepared. Of these 19, 10 were better qualified to teach either physics or chemistry or both. One teacher with 74 students in biology listed no college hours in any science. In Class C, 28 teachers, or 65%, were unprepared to teach biology. Of these 28, 9 were adequately prepared for chemistry, and 4 were adequately prepared for physics. Of the 43 teachers in Class C schools, 14 were better prepared for either chemistry or physics or both than for biology. In the same group, 21 were unprepared to teach any one of the three sciences, and 4 listed no college hours in any science.

In the 95 schools twelve different textbooks were used, but all these books covered approximately the same material. The teachers were asked what chapters or units they had stressed in their teaching. In most instances no particular thing was emphasized, but the three subjects that had been stressed by some were heredity, health, and nutrition, in the order given.

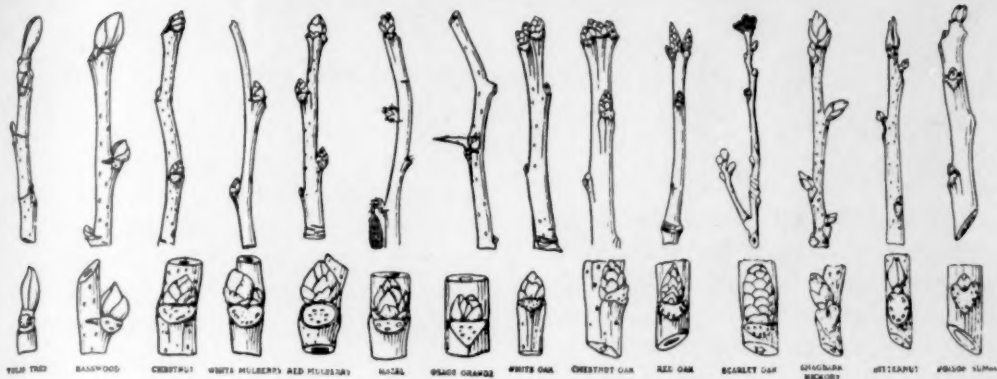
From the information received it seems definite that in the larger schools

the teachers are better placed in teaching the subjects they are prepared to teach, and also that there are more teachers in the state prepared to teach physics and chemistry than biology, while the opportunities for biology teachers are more numerous. If students embarking upon their training for a teaching career in Nebraska were acquainted with these facts, I believe that in a few years there would be a greater equalization between supply and demand which would result in better teaching and more ultimate good to both teachers and pupils. Unfortunately during the last few years teacher standards have of a necessity been lowered. In many instances requirements have had to be disregarded in order to have any teacher at all in the classroom. As a result there are entirely too many teachers with training in kindergarten work, for instance, teaching high school English. Obviously a great many of these misfits could be listed as wartime emergency cases, but we should try to make certain that they do not outlast the emergency. The personal answer to this problem can be made by each teacher who is training future teachers. Every teacher engaged in training other teachers should be vitally interested in directing into the profession only those who have the ability to add height and dignity to the profession, and perhaps the most important qualification is that the teacher be prepared to teach what he will be called upon to teach.

Visual Aids Issue II

A second *Special Issue* on VISUAL AIDS will appear in April, with Addison Lee, Austin High School, Austin, Texas, as guest editor. While all major articles have been definitely scheduled by now, brief items may be submitted until **February 10**.

American Biology Teacher Calendar For February



SOME COMMON TWIGS IN WINTER

FEBRUARY 1946

1. Raymond R. Wilcox, Plant Pathologist, born 1889	15. Robert W. Hegner, Zoologist, born 1880
2. George C. Wood, Sci- ence Text Writer, born 1878	16. Hugo de Vries, Ge- neticist, born 1848
3. Spencer Fullerton, Baird, Naturalist, born 1823	17. J. M. Westgate, Agriculturist, born 1878
4. Augustin de Candolle, Botanist, born 1778	18. Charles B. Davenport, Biologist, died 1944
5. Nathaniel M. Banta, Nature Editor, died 1932	19. Sen. Frederic C. Walcott, Conserva- tionist, born 1869
6. H. E. Wood, Verte- brate Paleontologist, born 1901	20. Arthur Newton Pack, Conservationist, born 1893
7. Louis Agassiz Fuentes, Nature Art- ist, born 1874	21. Harold Francis Wil- lard, Entomologist, b. 1884
8. Glover Merrill Allen, Naturalist, born 1879	22. William J. Robbins, Plant Physiologist, born 1890
9. Francis H. Wilson, Zoologist, born 1902	23. E. S. Burgess, Hun- ter College, botanist, died 1928
10. Edward Wilber Berry, Paleobotan- ist, born 1875	24. John Henry Com- stock, Entomologist, born 1849
11. James Chester Brad- ley, Entomologist, b. 1884	25. Edwin Charles Bes- sey, Botanist, died 1915
12. Charles Robert Dar- win, Naturalist, b. 1809	26. Walter Long Wil- liams, Veterinarian, born 1861
13. George Brown Goode, Zoologist, born 1851	27. Henry Chandler Cowles, Ecologist, born 1869
14. Christian G. von Esenbeck, Botanist, born 1884	28. This month's "blind spot." See below

NOTE: For best suggestions for February 28th sent to E. Laurence Palmer, Cornell University, Ithaca, New York, a set of 10 winter twig identification charts for class use will be sent free. Other charts will be sent to any making first suggestion accepted for any other date for the remainder of the year. Let's make our own calendar. How many of the above can you identify?

From the Secretary-Treasurer

SOME THOUGHTS ON BIOLOGY TEACHING

Now that the war is over, the emphasis on chemistry and physics as war studies will probably be lessened. It is up to us in biology to press forward and show our administrators how basic the study of biology really is to prepare young people for life in the complex world in which we live.

Text-book biology is not very satisfactory, no matter how good the book. To have a really good course the teacher must develop his own philosophy, then plan how best to present it so that the students will accept and assimilate the truths of biology. Only then does the text-book become a valuable help. Select the book best adapted to your needs. Make your course seasonal. Biology should be studied in part in the woods, by the bank of a stream, or by a marsh. If you cannot get your class to such locations, at least you can study insects, wild flowers, weeds, and trees first in the fall or last in spring so that students can bring in specimens.

Some teachers will plan their semester's work with the pupils, but in such cases teacher guidance is very important, for the students are not yet in a position to know what they want to study. Another plan used by the writer is to evaluate the course at the end of each semester and get pupil reactions as to the value of the various units and problems studied. This works out very well and keeps the course adapted to the needs of the students. At this time they are better able to tell what parts they think will be valuable for the next class, what parts not so valuable, and maybe they will think some parts of no value at all. These opinions are important guide posts for the next semester.

No one should be allowed to graduate from high school without a year of biology. No matter what one does after graduation, he must live. If biology functions as it should, one should live more successfully and be more interested in nature as a hobby. The person who can get away from the rush and problems of life for a week or even for a week end, and enjoy the birds, the wild flowers, and the trees, and the water will maintain his mental and physical health, and enjoy full and abundant life. The better care he takes of his body, the better it will function for him. Health is a prize that most people take for granted until they lose it. Biology teaches the life functions and disease prevention so that its study will help in keeping our next generation healthy. And don't forget the lessons of heredity, the use of intelligence instead of emotion in the selecting of a mate will promote a more happy family life and a better race of Americans.

CHANGE OF MEMBERSHIP YEAR

At our Representative Assembly in Chicago October 13, it was decided to change the membership and subscription year to start January 1, instead of July 1. The principal reason was the difficulty of estimating the number of magazines to print for October and November. We have been sending magazines to all who were on the preceding year's mailing list for those two months and then dropping those who do not renew. That means we give two free copies to all who do not renew. Also we get in many new members and want them to get all the magazines for the year but we cannot tell how many we will need. Last year we did not have enough and you were asked to send October maga-

zines back to the secretary and enough of you did so we could meet all requirements. Thank you. With the year starting January 1, members will automatically receive the October, November, and December magazines. They will be invited to renew, and new memberships will be solicited to start January 1 thus we will know about how many magazines we need. Those who do not renew will not receive any magazines after December. In this way the Association will save the price of some 800 magazines, or about \$200.00.

When bills are sent out next spring they will be for membership and magazines from July 1 to December 31, 1946, for 75 cents and for the year 1947, January 1 to December 31, for \$2.00.

OUR ST. LOUIS MEETING

March 27 to 30, 1946, THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE will hold their annual meeting in St. Louis, Missouri. THE NATIONAL ASSOCIATION OF BIOLOGY TEACHERS will have meetings Friday and Saturday, March 29 and 30.

The program is being planned by President Elect E. Laurence Palmer and President Whitaker, and will be published in the February journal. From advance information it appears that we will have an excellent program, one that all progressive biology teachers will want to attend. Aren't we all progressive? At least one indication is that we are members of a national association devoted to the interests of biology teaching. Another is the fact that you are reading this article.

Of course we cannot all attend the St. Louis meeting, but it is worth considerable effort to go. Can't afford it? Surely some cannot where the distance is too great, but for all who can arrange their budget of time and money there

are many values in attending national meetings. At the meetings in years past in Richmond, Columbus, Philadelphia, Dallas, and Cleveland, many people came from considerable distance and expressed themselves as well repaid for the money expended and time consumed. It isn't only listening to the speakers on our program that make the meeting of value. Contacts made with other biology teachers, meeting and talking with leaders in the field, maybe just getting away from home for a few days will do you good. Then, too, there are many other national societies meeting during those four days. The A.A.A.S. has general meetings at which the most prominent scientists of the world speak. There are no admission charges to any of these meetings, your membership in the N.A.B.T. is sufficient.

Write your friends "Meet me in St. Louis."

M. A. RUSSELL

DDT AGAIN

Biology teachers have a major responsibility in keeping their students and the public informed about the possibilities for good and evil of new products of the type of DDT. Many of the statements of the public press and the radio, while not deliberately false, are over-enthusiastic or ill-considered. Many are the result of putting two and two together and getting something other than four. Some statements are of course deliberately misleading, for commercial or other motives. For these reasons, biology teachers should make an effort to find as many reliable statements as they can and organize them into form suitable for class presentation. A short editorial in a recent (November, 1945) issue of *Nature Magazine* merits the thoughtful study of every biology

teacher, for it puts in very brief and easily readable form some of the most important items to be considered. Since the editorial is short, we are quoting it almost in full, as follows:

"As anyone who passes a drug store or reads a newspaper these days well knows, DDT is on the market. This, we believe, is a dangerously premature release to the general public of a potentially tremendously valuable insecticide. We do not yet know definitely what it will kill and what it will not kill; we do not yet know the proper doses and combinations; we do not even know whether there may be a delayed menace to human life in DDT. Nor do we know its long-range effect on soil organisms or plant life.

"We do know that DDT is lethal to many species of beneficial insects; that, sprayed five pounds to an acre, birds are killed; that, sprayed to kill mosquitoes and flies on a five-mile stretch of coastal forest, it left an appalling residue of dead fish and crabs on the shore; that it is particularly fatal to cold-blooded animals. . . .

"The speed and abandon with which DDT has gotten on the open market have exceeded even our direst fears, as expressed in article and editorial in March of this year. This is typical of our American habit of going off at half-cock; of destroying resources in ever-weening enthusiasm, only to be faced with regrets and the problems of restoration later. . . .

"About all that can be done, under the circumstances, is to warn again that the use of this insecticide should not be indiscriminate. Try it with household pests, but keep it out of the garden for the time being. Wait until we know what it will do and how it will do it before risking extensive and perhaps irreparable damage. With other good and adequate insecticides available, we can afford to be careful."

It seems unnecessary to add anything to the above concise statement concerning DDT, but it is perhaps worth mentioning a teaching relationship. DDT furnishes the biology teacher an excellent

illustration of the complexity of effects produced when the balance of nature is upset. As biology teachers we all know that any change in the balance affects not only the plant or animal directly acted upon, but many others in various degrees. We know that no species can be introduced, exterminated, domesticated, given an advantage or placed under a handicap without producing effects on many other species. But we may be teaching this web of life as an abstract principle. If so, here is DDT with its effects on flies and honey bees, cockroaches and fishes, et cetera, to furnish an excellent example—one that has the advantages of being concrete, practical and in the public eye.

SCIENCE ON THE AIR

Radio is bringing new impetus to the study of science in the schools of the Philadelphia area. Boys and girls from the third grade to the twelfth hear science programs in the classroom and follow their listening with experiment and research on their own.

"Science Is Fun," broadcast every Monday at 2:15 over Station WFIL, has been on the air for a little more than a year. The hero of "Science Is Fun" is none other than Egbert, the Mechanical Man in The Franklin Institute, who has been standing at the door saying, "How do you do? I am glad to see you," to Institute visitors for some ten years. Now every Monday afternoon, at 2:15 the magic of radio brings him to life. His programs, planned in units of "study," range all the way from hurricanes to house painting, from thunder storms to storms on the sun.

That Egbert has fired the imagination of thousands of boys and girls (the listening audience numbers well above 45,000) is an established fact.

First of all, ever since he has been on the air, he has received a great deal of fan mail; when he conducts a quiz program more questions are sent in than he can possibly handle in a fifteen-minute broadcast. When he does an experiment on the air to drive home a scientific fact, every boy and girl in the classroom does the experiment along with him, and thus proves things for himself. Moreover, teachers find that interest in science continues long after the broadcast period. Boys and girls bring in models to

demonstrate to their fellow students something they have heard about on the air. Visits to The Franklin Institute have increased 89% since the show was first aired in October, 1944. But what is most important of all, the youngsters realize that there are no national boundaries in the world of science; they realize the fact that present-day scientific achievement has been made possible by men of all nationalities.

The cooperation of the member organizations of the Museum Council in Philadelphia with the schools in the matter of educational broadcasting is one of the finest outcomes of the entire radio program in that city. Several educational agencies in the city cooperate with the schools in serving the community by radio. Each week under the auspices of the Zoological Society boys and girls in the elementary schools are taken for a radio "Trip to the Zoo." Thirty-three different animals of the Philadelphia Zoo are brought into the classroom via the air waves in "fact and fancy." Warren Kay, of the schools radio staff, tells a story about how an animal acquired some characteristic of his appearance, or, it may be, of his disposition. Combined with these fanciful tales, are true facts about the nature and habits of the animal. The facts help to clear up common misconceptions, and also encourage the proper care of domestic animals and pets.

Attendance at the Zoo has increased because children want to see the animals they have heard about; members of the Zoo's population have become popular radio "personalities." Besides encouraging trips to the Zoo the program has created an interest in animal lore and in science generally.

All of these programs on science are planned by the Radio Office of the Philadelphia Public Schools, in cooperation with the institutions involved. Teachers' Manuals for all the broadcast series are made available by the radio stations WFIL and WIP to every teacher in the grades to which the program is directed.

THE AMERICAN NATURE STUDY SOCIETY

One of the interesting items to arrive at the editor's desk recently was the fall number of *The American Nature Study Society News Letter*. Included in this news letter was a list of Nature Projects for schools and camps, prepared by Ruth Hubbard, staff member of the summer sessions of the Audubon Nature Center. Examples of the project lists are:

BIRD STUDY

1. Maintain a feeding station during the winter.
2. Build bird houses correctly proportioned for specific birds.
3. Make an electric questioner for bird identification.
4. Draw charts showing bird habitats.
5. Take early morning bird walks.
6. On a map of the western hemisphere draw bird migration routes. Find out where birds winter.
7. Establish a bird sanctuary.
8. In winter study bird nests, noting height above ground, how fastened, materials used, and size of territory of a particular bird.

INSECTS

1. Maintain an insect zoo.
2. Make charts showing life histories of insects or mount the specimens in a Riker mount or in deep boxes on pins.
3. Set up an observation beehive or ant colony.
4. Collect insect homes; galls, mud dauber nests, hornet nests, etc.

Anyone interested in this number of the *News Letter*, or in the society itself, should address Richard L. Weaver, Greenwich, Connecticut, RFD #4. Many readers will remember Mr. Weaver as the author of contributions to *The American Biology Teacher*, dealing with projects for bird study and with the filing and cataloging of Kodachromes.

MORE ABOUT THE NATIONAL MEETING

After the announcement on page 85 had gone to press, but in time to be included as a last-minute item, a letter arrived from President-elect E. Laurence Palmer, who is in charge of arrangements for the program. He indicates that chances are very good for having the following on the St. Louis program: FAIRFIELD OSBORN, Director of the New York Zoological Garden; EDWARD GRAHAM, of the Soil Conservation Service; CLAYTON SEAGEARS, Conservation Education Supervisor for New York State; JOHN BAKER, President of the National Audubon Society; L. B. SHARP, Director of Life Camps; JOHN W. SCOTT, Zoologist of the University of Wyoming; OTIS W. CALDWELL, botanist of the Boyce Thompson Institute, who will be the speaker at the banquet meeting. The general emphasis of the entire session will be *Conservation Education*, particularly as it applies to biology teaching.

Use the Home Pressure-Cooker to Sterilize Your Culture Media

Most small schools have no autoclave in which to sterilize media for growing bacteria. Books tell how to boil the stuff for an hour and if growth starts on it within a day or so to boil it again.

For the biology laboratory of limited resources, the easiest way to get ready for studying bacteria is to go about it as follows: Have several pupils thoroughly wash and dry 40 test tubes and about 20 Petri dishes. Show a couple of girls how to roll cotton plugs for the tubes so that they will fit tightly enough to sustain the weight of the tube and stick out about the mouth of the tube at least $1\frac{1}{2}$ inches. Have two more pupils wrap the dry Petri dishes 4 at a time in clean paper. Sterilize the Petri dishes so wrapped in a dry oven at a temperature just below the kindling point of the paper for about 90 minutes.

By using prepared nutrient agar in powdered form much time may be saved. It will be necessary only to add this (in quantities suggested on the bottle) to cold water, and bring to a boil (a 1000-ml. Erlenmyer Pyrex flask is ideal) to dissolve the constituents. Then with a pipette, the test tubes can be filled about $\frac{1}{3}$ full with the hot nutrient agar. Don't *pour* it into each tube as this will leave some agar on the sides near the

top, and when it cools, the cotton plug will be glued in! That's why the pipette! Put the plugged tubes of medium in a wire basket or tin can and then into the pressure-cooker. Fasten on the top, open the pet-cock and boil until steam comes out of the pet-cock. This drives out most of the air. Close cock and let pressure rise to 15 lbs. Let it remain there for 20 minutes and turn off source of heat. Allow pressure to fall by slow cooling, and when 0 pressure registers, open the pet-cock, unfasten the cover, remove the tubes and allow them to cool. About 20 of the tubes should be cooled in a reclining position so that agar slants will result. The others can be poured directly into the Petri dishes for culture plates, or can be re-melted later in hot water for pouring.

An improvised Arnold steam sterilizer can be made from a large tin can (such as a 5-gallon oil can) by cutting out the top and punching a half inch hole in the bottom. Invert over a pan of boiling water. The culture medium to be sterilized (in a flask) is placed on an inverted wire basket inside of the tin can. Steam from the boiling water will then surround the material to be sterilized. About a half hour of this treatment should be long enough if repeated 24 and 48 hours later.

DONALD S. LACROIX,
*Amherst High School,
Amherst, Massachusetts*

NEXT MONTH: *Field Trips Issue II*, with Lee R. Yothers of Rahway, New Jersey, as guest editor. Articles by Paul B. Sears, H. E. Jaques, Elmo N. Stevenson, C. M. Farner, Robert C. McCafferty, and others.



An Analysis of Articles in The American Biology Teacher, Volumes 1-7

Seven and a half years have elapsed since the organization of THE NATIONAL ASSOCIATION OF BIOLOGY TEACHERS and the establishment of its official journal, THE AMERICAN BIOLOGY TEACHER. The national organization was set up in July, 1938, and the first issue of the journal was published in October of that year.

The purpose of this article is to present in brief form an analysis of the material published in the first seven volumes of the journal. It would be impossible, within the limits of an article of this type, to mention, and much less to describe, all of the individual contents. The study included subject matter, length, authorship, illustrations and geographic distribution of the material presented.

SUBJECT MATTER

That the magazine is primarily for the benefit of teachers is shown by the decided emphasis on teaching methods and aids, curriculum problems, and visual aids.

Special issues on popular subjects, such as Visual Aids, Field Trips, to mention two, have been published about two or three times a year. This custom, started in 1941, may account in part for the larger number of articles on those subjects. A total of thirteen special issues have been published to date, with two planned for Volume 8.

The 344¹ major articles classified were distributed as follows:

¹ Articles continued in two or more issues were classified as single papers for purposes of classification according to subject matter, but as more than one in some of the other classifications. Also some of the studies were completed before the last issues of Volume 7 were available. Therefore the total number of articles varies under different headings.

Teaching Methods	66
Curriculum Problems	46
Visual Aids	43
Teaching Aids	36
Field Biology	31
Philosophy of Biology	23
Biology in Wartime	19
Health	15
Applied Biology	12
Biology Clubs	10
Conservation Education	10
Physiology	10
Teacher Training	8
Vocational Biology	8
Evolution and Heredity	7

LENGTH

The median length of articles over a period of seven years was two pages. College and "professional" contributors tend to write the longer articles; both their median and maximum length of articles were higher than those of the high school contributors.

The longer articles are those written on special subjects, like Conservation Education or phases of Physiology.

AUTHORSHIP

Authors from high schools and from colleges or universities wrote the major portion of all articles for THE AMERICAN BIOLOGY TEACHER, and the two were almost evenly divided. Contributors from other sources seemed to write on subjects especially allied to their occupations, or on timely non-teaching subjects.

Of the ten articles written by medical doctors, five were on the subject of health. These five comprised one-third of all articles on that subject. Contributors from research institutes were impartial in their choice of fields—the

number of subjects equaling the number of authors.

The total number of individuals making contributions of all types, including notes and brief items, as well as major articles, is approximately 400.

For the 340 major articles classified, the figures are as follows:

High School teachers	156
Colleges and Universities	130
All others ²	54

ILLUSTRATIONS

The last two years have seen more and more illustrations being used. The number of illustrations per issue is approximately double that of previous years. This increase has come through the use of illustrations in more individual articles, the year 1944 being a top year for these.

Visual Aid papers were most frequently illustrated, as shown by the following table of percentages of each type illustrated.

60% of Visual Aid papers
40% " Conservation Education
35% " Field Biology
30% " Biology Clubs
25% " Teaching Aids and Teaching Methods (each).

² Under the heading, "All Others," are those articles submitted by members of organizations, museums, doctors of medicine, research institutes, governmental agencies, private laboratories, students, and individuals with no professional connections.

Back Numbers AMERICAN BIOLOGY TEACHER

Volumes II to VII

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Make remittance to

M. A. RUSSELL, Sec'y-Treas.,
403 California Avenue,
Royal Oak, Michigan.

GEOGRAPHIC DISTRIBUTION

Of the 347 major articles classified, the geographic distribution was as follows:

New York	61
Illinois	49
California	25
Massachusetts	24
Ohio	23
Pennsylvania	15
Kansas	13
Indiana	12
Iowa	11
D. C.	10
New Jersey	10
Connecticut, Michigan, Missouri, New Hampshire, Texas, Virginia, Washington, Wisconsin 5-9 each	
Alabama, Canal Zone, Colorado, Idaho, Kentucky, Louisiana, Minnesota, Montana, North Carolina, North Dakota, Oklahoma, Oregon, Rhode Island, South Dakota, Tennessee, Vermont, West Virginia 1-4 each	

Of the other articles classified, geographic distribution was as follows:

Colorado	94
Illinois	75
New York	51
Kansas	50
Michigan	22
Pennsylvania	18
Virginia	14
Ohio	11
Indiana	10
Massachusetts	10
Fourteen other states—less than 9 each	
Unsigned	152

The authors wish to express their gratitude to Mr. M. A. Russell for his assistance with the analysis of Volumes 1 and 2.

DOROTHY LUNS福德,
State Teachers College, Emporia,
Kansas
LEE R. YOTHERS,
Rahway High School, Rahway,
New Jersey

EDUCATION FIGHTS POLIOMYELITIS

The power of education gave added strength to the fight against poliomyelitis last year. That strength was needed—more than 13,000 cases of polio were reported in the United States in 1945, fourth highest year on record in this country. Epidemics raged in sections of Tennessee, Utah, Illinois, New York and Montana.

Record contributions to the 1945 *March of Dimes*, annual appeal of THE NATIONAL FOUNDATION FOR INFANTILE PARALYSIS, enabled the Foundation and its local chapters to continue and extend the many-sided war against the Great Crippler. As a part of its educational campaign, the Foundation broadened public knowledge of the disease through newspapers, magazines, booklets, leaflets, moving pictures and radio broadcasts.

In the schools, teachers played a vital role in the battle against polio by their educational work with students. At home, parents helped combat the disease by acquiring and sharing with their families the information on polio made available by the Foundation.

From the ranks of non-professionals last summer came the new PEV organization—POLIO EMERGENCY VOLUNTEERS—to battle the Great Crippler with knowledge and trained hands. More than 2,000 men and women from all walks of life have joined this organization since its formation. Recruited by local chapters of the Foundation and trained under professional supervision, PEVs complete a 16-hour course of instruction in the nature of poliomyelitis and elementary nursing care for polio patients.

The National Foundation appropriated more than \$2,000,000 for educational and training programs on professional and public levels. More than half these appropriations were for scholarships in physical therapy. A serious national shortage of qualified physical therapists developed early in World War II and still persists.

Physicians, nurses and medical social workers were given the opportunity to study modern theory and techniques in poliomyelitis through special medical school courses supported by grants from the Foundation.

Living up to its pledge that "no victim of polio shall go untreated for lack of funds, regardless of age, race, creed or color," the Foundation sent nearly \$1,000,000 in emergency aid to epidemic areas, supplementing the dwindling funds of local chapters. Poliomyelitis is one of the most expensive diseases known to medicine. Many victims of past epidemics must receive continuing care, sometimes for several years. Each year's outbreaks add new names to the steadily growing list. Hospitalization for a single patient costs more than \$2,500 per year.

Very few family budgets can stand such a strain.

The Foundation, in its eight year history, has appropriated over \$8,000,000 for education and research: For research toward the goal of a preventive and a cure for infantile paralysis, for the training of physicians, nurses, physical therapists, medical social workers and others in modern methods of treating and helping polio victims, for a broad program of education—a never-ending campaign to give the facts about polio to the people of America.

Of all contributions in any county to the annual *March of Dimes* conducted January 14-31 by the National Foundation, half is retained by the local chapter for special equipment, hospitalization, transportation, treatment and care of polio patients. The other half goes to the national organization for research, education and emergency aid in epidemics.

OUR MEMBERSHIP PROGRAM

We want to express, belatedly, our gratitude to Miss Marie Knauz for her splendid work as national membership chairman until last March. Her goal was "Three thousand membership for NABT" and she worked tirelessly toward that end. She has asked us to express for her sincere thanks to all those who were her co-workers over the nation; and to solicit the same whole-hearted support afforded her for her successor.

When she terminated her work in March, Dr. H. P. K. Agersborg, McKendree College, Lebanon, Illinois, took over. Dr. Agersborg, though among our newer ranks, has shown the greatest interest in the welfare of NABT; already he has done a tremendous job in organizing the entire nation into nine regions, each under the leadership of a regional chairman. In turn, there are state chairmen and sub-chairmen so that the entire country is covered by someone who is informed about NABT. Thus, we have opportunity for contact with practically every potential member in the nation. The amount of correspondence involved in this task of setting up regions, chairmen, and workers was great and Dr. Agersborg has given of his time and effort unstintingly.

It's not too late to express ourselves to this program. Everyone of you, as you read this, won't you try to figure out some way to bring a reward to Dr. Agersborg and his workers, and to a fellow-teacher the chance to receive a splendid *Journal*? All the reward the membership committee wants is that member; all that member will want, once he has seen it, will be our *Journal* and a part in the ASSOCIATION which produces it. And remember: a non-paying member cannot have a part!

RECENT PUBLICATIONS

GLOYD, H. K., The Problem of Too Many Snakes, *The Chicago Naturalist*, Vol. 7, No. 4, p. 87-97. 1945.

After pointing out that most snakes are economically beneficial, discusses various control methods for use in those instances in which such methods are desirable, e.g. the methods of the South Dakota Department of Agriculture, used in the control of the prairie rattlesnake.

GLOYD, H. K., Texas Snakes, *Texas Geographic Magazine*, Vol. 8, 1944; reprinted for The Chicago Academy of Sciences, 18 pp. illus.

Brief descriptions of the almost 80 different kinds of snakes known to occur within the borders of Texas, organized into three main groups, 1. non-poisonous, 2. mildly poisonous, 3. dangerously poisonous; discussion of protection from snake bites and of first-aid procedures.

SPOEHR, ALEXANDER, The Florida Seminole Camp, *Field Museum of Natural History*, Vol. 33, No. 3, pp. 117-150, illus. 50¢.

A description of the camp, its people and houses, family groups, social and biological conditions of life, bibliography and index.

New *Anatomical Charts*, published by Rudolph Schiek Publishing Company, 700 Riverside Drive, New York 31, N. Y., are as follows:

- No. 17, The Abnormal Heart
- No. 11 A, Calories, Proteins and Minerals in Average Servings
- No. 11 B, Vitamins in Average Servings
- No. 20, The Respiratory System
- No. 21, Endocrine Glands
- No. 15, The Human Skeleton, front view
- No. 16, The Human Skeleton, back view

PALMER, E. LAURENCE, Cover, *Cornell Rural School Leaflet*, Vol. 38, No. 4, pp. 32, 1945. illus.

How various types of cover protect wild life and what we should do about it. Many excellent cartoons and other illustrations.

NEA HANDBOOK, *National Education Association of the United States*, Washington 6, D. C., first edition, 1945, \$1.00.

Includes Committees, Departments, Divisions, Publications, Facts concerning current education toward problems, State Statistics, and many other materials.

BUSH, VANNEMAR, *Science, the Endless Frontier*, U. S. Government Printing Office, Washington, pp. 184, 1945.

The much discussed "Bush Report" includes chapters on The War Against Disease, Science and the Public Welfare, Renewal of Our Scientific Talent, A Problem of Scientific Reconversion, and The Means to the End, also five appendices.

American Red Cross First Aid Textbook, The Blakiston Company, Philadelphia, Revised, pp. 254, illus.

This well known text has been so thoroughly revised as to be virtually a new book. The many clever illustrations and comprehensive index are outstanding features.

Sugar Research Foundation, Inc. and its Prize Award Program, Sugar Research Foundation, Inc., 99 Wall Street, New York 5, N. Y., pp. 48, 1945.

The activities of the Sugar Research Foundation, Inc., listing specific research projects and outlining many of the modern uses of sugar.

NEA RESEARCH BULLETIN, School Expenditures in War and Peace, *National Education Association of the United States*, 1201 16th St., N.W., Washington 6, D. C., Vol. XXIII, No. 3, pp. 59-91. 1945.

A well illustrated presentation of statistics on money spent for schools, both in terms of total amounts and by comparison with expenditures for other purposes.

SCIENTISTS OF TOMORROW, *Science Clubs of America*, Administered by Science Service, 1719 N. St., N.W., Washington 6, D. C., pp. 136, 1945.

The essays of the winners of the Westinghouse School Scholarships in the fourth annual science talent search, various general reports and announcements concerning the forthcoming talent search, photographs of the winning essayists on the inside cover

EBAUGH, CAMERON D., Education in Chile, *United States Government Printing Office*, Bulletin 1945, No. 10, Washington, D. C. 25c. pp. 123.

A report on the development of education; teacher preparation and qualification; elementary, secondary, vocational, and higher education. A part of the government program of cultural cooperation with Latin America under the auspices of the Department of State.

WAGER, PAUL W., One Foot on the Soil, *Bureau of Public Administration*, University of Alabama, University, Alabama, pp. 230, 1945.

A study of subsistence homesteads in Alabama, primarily sociological but with many biological implications, particularly in the chapter on Land Utilization.

RAHN, OTTO, *Microbes of Merit*, Jaques Cattell Press, Lancaster, Pennsylvania. viii + 277 pages. illus. 1945. \$4.00.

In this member of the *Humanizing Science* series, the author explains bacteria in relation to our everyday life. While there is no particular attempt to avoid technical terms when such are necessary, the language of the entire book is clear and concise and should not greatly trouble the lay reader, even in

the more difficult areas. The style of *Microbes of Merit* is well illustrated by the following quotation. "Let us compare that with people in a city. The average width of a person may be estimated as one foot. If men were as crowded as bacteria in a full-grown culture, every person would be 10 feet apart from another person at the right, at the left, at the front, at the back, above and below. That is not very different from life in a one-room apartment in a large apartment house. Many families have much closer living quarters, and in an office skyscraper or in a department store, people in daytime are much more crowded than a billion bacteria in one cubic centimeter, without suffering seriously."

Why we need the beneficial bacteria—to keep the soil productive, to produce some of our most desirable foods and drinks, to furnish food materials for the higher plants and so for animals, to aid in the production of industrial products—this is the main theme of the book. There is enough of the historical background of bacteriology to place modern research in its setting, and enough of fundamental principles to give the generalizations a sound basis in the mind of the reader. The illustrations, both the photographs and the drawings, are far above average. The index, though brief, is well organ-

ized and seems adequate for the purposes of the book.

COVER-TO-COVER READER

MISS DOROTHY LUNSFORD, co-author of the "analysis of articles" appearing on page 89 of this issue, senior biology major at Kansas State Teachers College, has been doing the stenographic work of the office of editor-in-chief. She may well be the only college student in the country who has read all of the articles that have ever appeared in *THE AMERICAN BIOLOGY TEACHER*.

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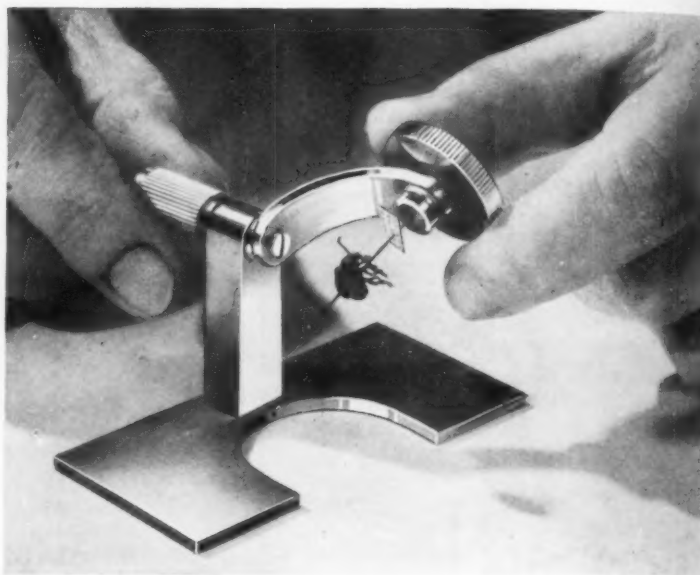
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